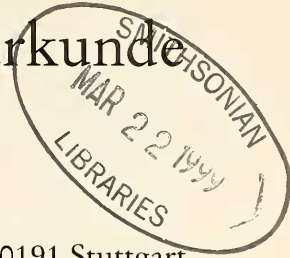


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Leiochrini (Coleoptera: Tenebrionidae) from Borneo

By Wolfgang Schawaller*), Stuttgart

With 45 figures

Summary

All known and newly collected species of the tenebrionid tribe Leiochrini from Borneo (Banguay, Brunei, Kalimantan, Sabah, Sarawak) are treated with notes on taxonomy and distribution (51 species). Phylogenetic and biological remarks are added. The following species are described as new: *Stethotrypes crockerensis* n.sp., *Stethotrypes dorotheae* n.sp., *Stethotrypes poringicus* n.sp., *Stethotrypes punggulicus* n.sp., *Stethotrypes sayapensis* n.sp., *Leiochrodes christophi* n.sp., *Leiochrodes kinabaluensis* n.sp., *Leiochrodes merkli* n.sp. and *Leiochrodes smetanai* n.sp. *Derispia xantusi* Kaszab 1946 is considered a new synonym of *Derispia octomaculata* (Westwood 1883).

Zusammenfassung

Alle bekannten und neu gesammelten Arten der Tenebrioniden-Tribus Leiochrini von Borneo (Banguay, Brunei, Kalimantan, Sabah, Sarawak) werden behandelt mit Angaben zur Taxonomie und Verbreitung (51 Arten). Phylogenetische und biologische Bemerkungen werden angefügt. Neue Arten werden beschrieben, eine Synonymie wird errichtet (Taxa siehe „Summary“).

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*) Contributions to Tenebrionidae, no. 21. – For no. 20 see: Revue suisse Zool. 105: 375–382; 1998.

1. Introduction

The Tenebrionidae are a quite polymorphic family among which the Leiochrini form a relatively uniform tribe, with the body shape and often with a colour pattern looking like coccinellids. They occur mostly in the Oriental and Papuan Regions, a few species live in the African tropics and in Madagascar; they are completely lacking in the Neotropics. KASZAB (1946) presented a taxonomic monograph of this group, later he summarized new records and species for the described 11 partly monotypic, partly species-rich genera (KASZAB 1961a, 1961b, 1961c).

The Tenebrionidae of Borneo in general have never been summarized, only GEBIEN (1914) published several species including a few Leiochrini in a comprehensive paper. In connection with the preparation of an actual check-list of all Tenebrionidae from Borneo including newly collected material I try to summarize in this paper the knowledge about the Leiochrini from that island (now 51 species).

Borneo is treated herein as a name for the complete island in a geographical sense, including the political territories Brunei, the Indonesian Kalimantan and the Malaysian Sabah and Sarawak. Records from the small adjacent island Banguay northeast of Borneo are included. Most of the newly collected material originates from Sabah because of easy access, material from other regions is lesser known (in particular from the bigger Kalimantan), thus our knowledge is far from being complete.

Leiochrini are restricted to humid forests; both adults and larvae occur in soil litter, in rotten wood, on and under barks, feeding very probably on mosses and algae. Thus they are very threatened by cutting primary forests and we must be afraid that many species extinguished before being scientifically discovered.

Abbreviations

CAO	Collection ANDO, Osaka (Dr. K. ANDO);
CBB	Collection BECVAR, Ceske Budejovice (S. BECVAR);
CBH	Collection BREMER, Heidelberg (Prof. H. J. BREMER);
CSO	Collection SHIBATA, Osaka (Dr. K. ANDO);
HNHM	Hungarian Natural History Museum, Budapest (Dr. O. MERKL);
MHNG	Muséum d'Histoire naturelle, Genève (Dr. I. LÖBL);
SMNS	Staatliches Museum für Naturkunde, Stuttgart (author).

Acknowledgments

I thank Dr. KIOSHI ANDO (Osaka), STANDA BECVAR (Ceske Budejovice), Prof. Dr. HANS J. BREMER (Heidelberg), Dr. IWAN LÖBL (Geneva) and Dr. OTTO MERKL (Budapest) for the loan of material under their care. The authorities of Sabah Parks kindly permitted field work of the author in autumn 1996, which was supported also by DOROTHEE GRIMM (Würzburg) and Dr. CHRISTOPH HÄUSER (Stuttgart).

2. Species list

2.1. *Stethotrypes bicornutus* Gebien 1914

Records: Banguay (GEBIEN 1914), KASZAB (1946).

Material: Not seen.

Remarks: This and 4 further species of *Stethotrypes* I have not seen, thus they are not figured in this paper. However, they can be identified quite easily by the figures given in KASZAB (1946, 1961c).

Distribution: Banguay northeast of Borneo.

2.2. *Stethotrypes bituberculatus* Kaszab 1946

Records: Southeastern Borneo/Martapura (KASZAB 1946).

Material: Not seen.

Distribution: Borneo.

2.3. *Stethotrypes borneensis* Kaszab 1961

Records: Sarawak (KASZAB 1961c).

Material: Sarawak, Kuching, Santubong, 26. III. 1990 leg. RIEDEL, 2 ex. SMNS. – Sarawak, Kuching, Bako NP, 27.–29. III. 1990 leg. RIEDEL, 8 ex. SMNS. – Sarawak, confluence of Sun Oyan and Mujong river, E Kapit, 50 m, 18. V. 1994 leg. LÖBL & BURCKHARDT, 8 ex. MHNG, 1 ex. SMNS. – Kalimantan, Gunung Palung NP, 1°13'S/110°7'E, 18.–28. VII. 1993 leg. MERKL, 1 ex. HNHM (det. MERKL).

Remarks: The elytra of some specimens are dark brown with 2 indistinct reddish spots whereas in the description the elytra are said to be unicoloured dark brown. This is considered to be due to infraspecific variability because the structure of the aedeagus coincides quite well with the figures given in the description (KASZAB 1961: figs 1–2).

Distribution: Borneo.

2.4. *Stethotrypes clypealis* Kaszab 1961

Records: Sarawak (KASZAB 1961c).

Material: Not seen.

Distribution: Borneo.

2.5. *Stethotrypes crockerensis* n.sp. (figs 1–2)

Holotype (♂): Sabah, Crocker Range NP, NW Keningau, 900–1200 m, 16.–20. XI. 1996 leg. SCHAWALLER (SMNS).

Paratype: Same data as holotype, 1 ♂ SMNS.

Derivatio nominis: Named after the Crocker Range NP.

Diagnosis: To be recognized by the asymmetrical shape of the aedeagus, by the lack of distinct horns on the male head and by unpunctured elytra.

Description: Body shape as usual in the genus, body length 2.5 mm. Dorsal side unicoloured castaneous, head somewhat darker, disc of elytron lighter with on-

ly the sutural part and the lateral sides in the middle darker castaneous as pronotum. Male head (fig. 2) without distinct horns but with distinctly elevated anterior corners of the clypeus, head without tubercles; antenna with the 3 basal antennomeres lighter, antennomere 3 about 1.2 times longer than antennomere 4. Pronotum without peculiarities, without punctation. Elytra shiny and without punctation, lateral margin to be seen in dorsal view only in the anterior half. Legs without peculiarities. Aedeagus (fig. 1) bent in lateral view, penis long and distinctly asymmetrical, of tube-like shape with 2 basal sclerite plates.

Discussion: See *Stethotrypes sayapensis* n.sp. (chapter 2.13.).

2.6. *Stethotrypes cruciatus* Kaszab 1961

Records: Sarawak (KASZAB 1961c).

Material: Not seen.

Distribution: Sumatra, Borneo.

2.7. *Stethotrypes dorotheae* n.sp. (figs 3–4)

Holotype (♂): Sabah, Mt. Kinabalu NP, Sayap, 1000 m, 25.–29. XI. 1996 leg. SCHAWALLER (SMNS).

Derivatio nominis: Named after DOROTHEE GRIMM (Würzburg) for various support during our joint field work in Sabah.

Diagnosis: To be recognized by the asymmetrical shape of the aedeagus, by broad horns on the male head, by unpunctured elytra and by bigger body size.

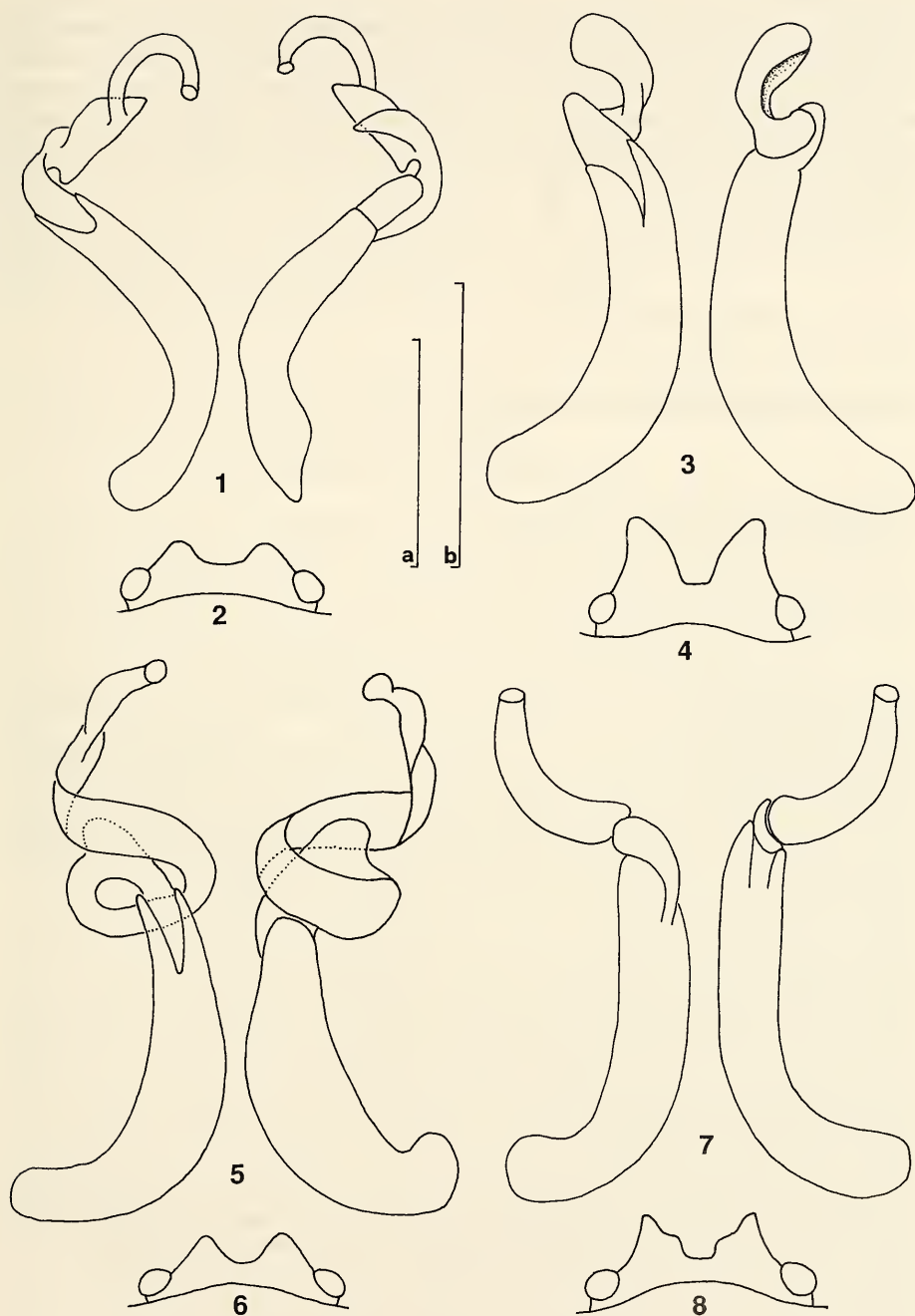
Description: Body shape as usual in the genus, body length 2.8 mm. Dorsal side unicoloured castaneous, head somewhat darker, elytron with 2 indistinctly bordered lighter spots. Male head (fig. 4) with 2 broad and short horns bent somewhat outwards, base of the horns separated in the middle of the clypeus, head without tubercles; antenna with the 3 basal antennomeres lighter, antennomere 3 about 1.1 times longer than antennomere 4. Pronotum without peculiarities, without punctation. Elytra shiny and without punctation, lateral margin to be seen in dorsal view only in the anterior half. Legs without peculiarities. Aedeagus (fig. 3) bent in lateral view, penis short and distinctly asymmetrical like a distorted spoon.

Discussion: See *Stethotrypes sayapensis* n.sp. (2.13.).

2.8. *Stethotrypes glaber* Gebien 1914

Records: Kinabalu (GEBIEN 1914); Kinabalu, 1500 m (KASZAB 1946).

Material: Borneo, Baujn, German Mission, 4 ex. HNHM. – Sarawak, Kapit Distr., Rumah Ugap, Sut river, 3.–9. III. 1994 leg. HORÁK, 18 ex. CBH. – Sarawak, Kapit Distr., Sebong, Baleh river, 9.–21. III. 1994 leg. HORÁK, 1 ex. CBH. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 485 m, 21.–29. VIII. 1988 leg. SMETANA, 7 ex. MHNG, 2 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500 m, 29. XI.–2. XII. 1996 leg. SCHAWALLER, 1 ex. SMNS. – Sabah, Mt. Kinabalu NP, Sayap, 1000 m, 25.–29. XI. 1996 leg. GRIMM & SCHAWALLER, 10 ex. SMNS. – Sabah, Bingkor N Keningau, 400–500 m, 19.–20. XI. 1996 leg. SCHAWALLER, 5 ex. SMNS. – Sabah, Crocker Range NP, NW Keningau, 900–1200 m, 16.–20. XI. 1996 leg. GRIMM & SCHAWALLER, 3 ex. SMNS. – Sabah, Crocker Range NP, Mawar waterfall, 17. VI. 1996 leg. KODADA, 7 ex. SMNS. – Sabah, Crocker Range NP, Longkoganun, 750–850 m, 19.–21. VI. 1996 leg. KODADA, 1 ex. SMNS. – Sabah, Crocker Range, Gunung Emas, 15.–27. IV. 1993 leg. JENIŠ & ŠTRBA, 3 ex. CBH. – Sabah, Crocker Range, Gunung Emas, 500–1900 m, 6.–21. V. 1995 leg. JENIŠ, 3 ex. CBH.



Figs 1-8. Aedeagus and male head. - 1-2. *Stethotrypes crockerensis* n.sp.; - 3-4. *Stethotrypes dorotheae* n.sp.; - 5-6. *Stethotrypes poringicus* n.sp.; - 7-8. *Stethotrypes sayapensis* n.sp. - Scales: 1.0 mm (a: head, b: aedeagus).

Remarks: This species seems to have a similar colour variability as *borneensis*. The specimens of the type series are said to be unicoloured brownish, whereas the new specimens from Poring have the elytra dark brown with 3 indistinct reddish spots (2 smaller spots in the basal part, 1 bigger spot in the medial part), and the new specimens from Bingkor have the elytra brownish with different lighter longitudinal spots. The aedeagi of all available males are built as figured in KASZAB (1946: figs 13–14).

Distribution: Borneo.

2.9. *Stethotrypes latifrons* (Pic 1921)

Records: Kinabalu (KASZAB 1946).

Material: Not seen.

Distribution: Borneo (type locality Kinabalu).

2.10. *Stethotrypes longicornis* (Pic 1921)

Records: Sarawak (KASZAB 1961c).

Material: Western Sarawak, Quop, 16. III. 1914 leg. BRYANT, 1 ex. HNHM.

Distribution: Malayan Peninsula, Sumatra (type locality), Borneo.

2.11. *Stethotrypes poringicus* n.sp. (figs 5–6)

Holotype (♂): Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500 m, 23.–24. XI. 1996 leg. SCHAWALLER (SMNS).

Paratypes: Same data as holotype, 9 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, eastern ridge trail, 790 m, 16. VIII. 1988 leg. SMETANA, 20 ex. MHNG, 5 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, Langanan creek, 885 m, 22. VIII. 1988 leg. SMETANA, 1 ex. MHNG, 1 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, Kipungit creek, 530 m, 26. VIII. 1988 leg. SMETANA, 3 ex. MHNG. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500 m, 11. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. MHNG.

Derivatio nominis: Named after the type locality Poring Hot Springs.

Diagnosis: To be recognized by the asymmetrical shape of the aedeagus, by the lack of distinct horns on the male head and by unpunctured elytra.

Description: Body shape as usual in the genus, body length 2.5 mm. Dorsal side unicoloured castaneous. Male head (fig. 6) without distinct horns but with distinctly elevated anterior corners of the clypeus, head without tubercles; antenna with the 3 basal antennomeres lighter, antennomere 3 about 1.2 times longer than antennomere 4. Pronotum without peculiarities, without punctation. Elytra shiny and without punctation, lateral margin to be seen in dorsal view only in the anterior half. Legs without peculiarities. Aedeagus (fig. 5) bent in lateral view, penis long and distinctly asymmetrical of distorted band-like shape without basal sclerite plates.

Discussion: See *Stethotrypes sayapensis* n.sp. (2.13.).

2.12. *Stethotrypes pungulicus* n.sp. (figs 9–10)

Holotype (♂): Sabah, Bajnaran Maitland, Batu Punggul, 25.–27. V. 1995 leg. JENIŠ (MHNG).

Derivatio nominis: Named after the type locality Batu Punggul.

Diagnosis: To be recognized by the asymmetrical shape of the aedeagus, by long and narrow horns on the male head and by unpunctured elytra.

Description: Body shape as usual in the genus, body length 2.6 mm. Dorsal side unicoloured castaneous. Male head (fig. 10) with 2 narrow and long horns, base of the horns separated in the middle of the clypeus, head without tubercles; both antennae broken. Pronotum without peculiarities, without punctuation. Elytra shiny and without punctuation, lateral margin to be seen in dorsal view only in the anterior half. Legs without peculiarities. Aedeagus (fig. 9) more or less straight, penis extraordinarily long and distinctly asymmetrical of distorted band-like shape without basal sclerite plates.

Discussion: See *Stethotrypes sayapensis* n.sp. (2.13.).

2.13. *Stethotrypes sayapensis* n.sp. (figs 7–8)

Holotype (♂): Sabah, Mt. Kinabalu NP, Sayap, 1000 m, 28. XI. 1996 leg. GRIMM (SMNS).
Paratypes: Same data as holotype, 2 ex. SMNS.

Derivatio nominis: Named after the type locality Sayap.

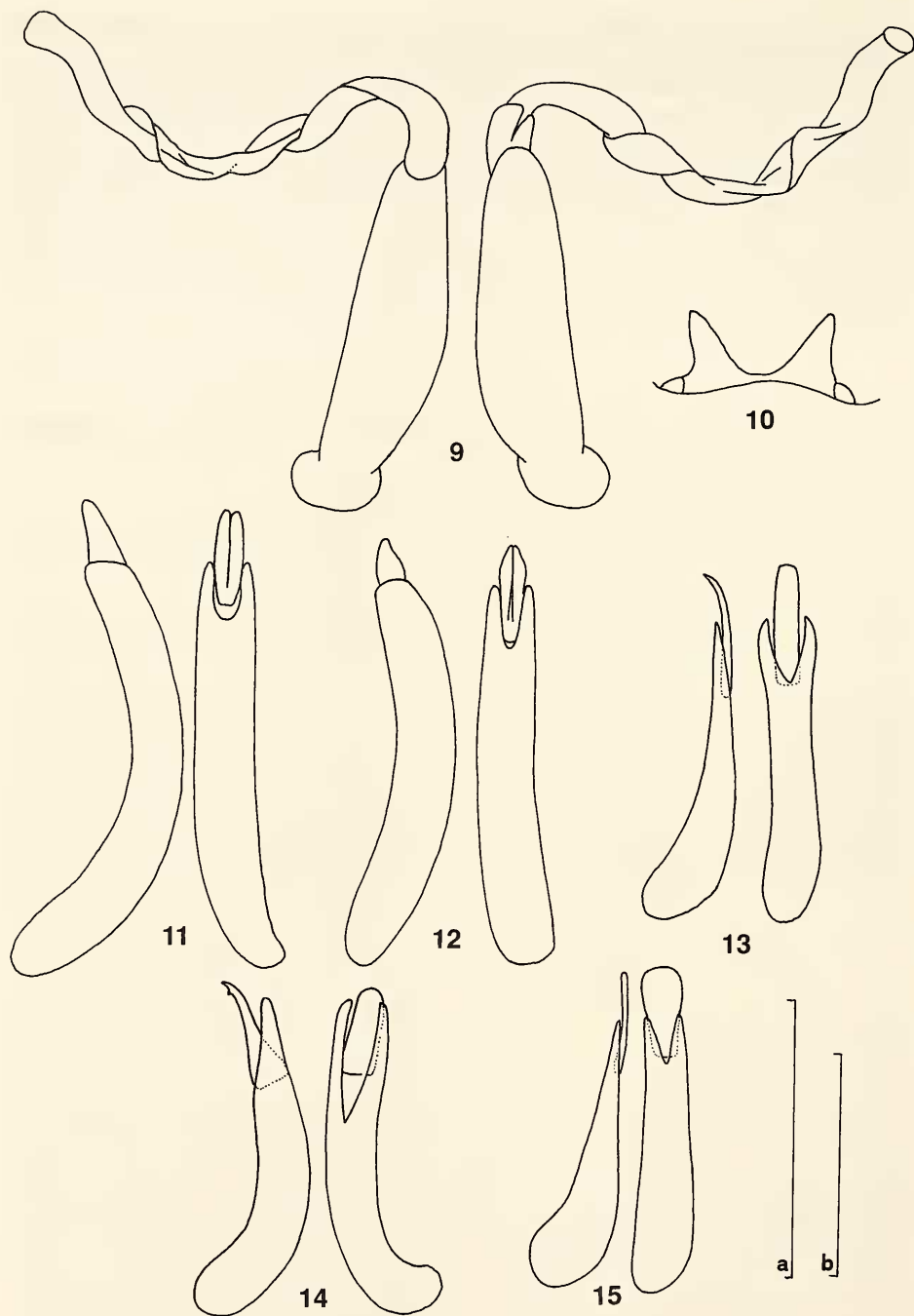
Diagnosis: To be recognized by the asymmetrical shape of the aedeagus, by broad and short horns on the male head and by unpunctured elytra.

Description: Body shape as usual in the genus, body length 2.4–2.6 mm. Dorsal side black, elytron with a distinct castaneous colour pattern, 1 round spot near base, 1 round spot on the disc and 1 wide spot near the tip. Male head (fig. 8) with 2 broad and short horns, distinctly sinuate at the interior margin, base of the horns separated in the middle of the clypeus, head without tubercles; antenna with the 3–4 basal antennomeres lighter, antennomere 3 about 1.1 times longer than antennomere 4. Pronotum without peculiarities, without punctuation. Elytra shiny and without punctuation, lateral margin to be seen in dorsal view only in the anterior half. Legs without peculiarities. Aedeagus (fig. 7) bent in lateral view, penis long and distinctly asymmetrical of bent band-like shape with 1 basal sclerite plate.

Discussion: The genus contains up to now 13 species only 3 possess an asymmetrical aedeagus with a bent or distorted penis: *boettcheri* Kaszab 1946 (Philippines), *borneensis* Kaszab 1961 (Borneo) and *glaber* Gebien 1914 (Borneo). In *boettcheri* and *glaber*, the bent or distorted penis is long and of tube-like shape with a blunt tip, in *borneensis* the distorted penis is shorter and possesses an acute tip (see figs in KASZAB 1946, 1961c), in comparison with these species the aedeagus of *crockerensis* n.sp., *dorotheae* n.sp., *poringicus* n.sp., *punggulicus* n.sp. and *sayapensis* n.sp. are distinctly different as herein described and figured. The aedeagi of *glaber* and *sayapensis* n.sp. are similar, however in *glaber* the penis is of tube-like shape, whereas in *sayapensis* n.sp. the penis is flat and of band-like shape (and the male head is different). The bent or distorted, asymmetrical aedeagus is considered as an apomorphic character which proves these species to be a monophyletic group.

The shape of the horns on the male head is of lesser taxonomic value. In *crockerensis* n.sp. and *poringicus* n.sp. these horns are reduced to elevated anterior corners of the clypeus like in *latifrons* (Pic 1921). In *dorotheae* n.sp. these horns are similar to those of *longicornis* (Pic 1921); this species, however, has a quite different, namely symmetrical aedeagus. In *sayapensis* n.sp. these horns are similar to those of *unicolor*; this species has also a different symmetrical aedeagus.

The lack of punctuation on the elytra share *crockerensis* n.sp., *dorotheae* n.sp., *po-*



Figs 9–15. Aedeagus and male head. – 9–10. *Stethotrypes pungulicus* n.sp.; – 11. *Derispia javana* (NW Keningau); – 12. *Derispia javana* (Rafflesia Centre); – 13. *Derispia gibbosa*; – 14. *Derispia insularis*; – 15. *Derispia octomaculata*. – Scales: 1.0 mm (a: aedeagus, b: head).

ringicus n.sp., *punggulicus* n.sp. and *sayapensis* n.sp. with most of the other congeners. However, this character should be checked carefully, because traces of punctural rows sometimes exist on the ventral side of the elytra shining through the light cuticula.

2.14. *Derispia borneensis* Kaszab 1946

Records: Sandakan (KASZAB 1946).

Material: Not seen.

Distribution: Borneo.

2.15. *Derispia gibbosa* (Pic 1921) (fig. 13)

Records: Borneo (KASZAB 1946); Sarawak, Kuching, Penang (KASZAB 1961a).

Material: Sarawak, Belaga Distr., Long Linau, 17.–21. III. 1990 leg. RIEDEL, 1 ex. SMNS.

Remarks: The aedeagus of the above listed male (fig. 13) fully corresponds to the figure given in KASZAB (1946: fig. 83). The male (female unknown to me) possesses a distinct acute tubercle in the middle of the labrum, an unusual and as yet unknown character.

Distribution: Borneo (type locality), Sumatra.

2.16. *Derispia insularis* Kaszab 1961 (fig. 14)

Records: Mt. Mulu, Sarawak (KASZAB 1961a).

Material: Sabah, Mt. Kinabalu NP, Poring Hot Springs, near Bat Cave, 600 m, 10. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. MHNG. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 550–600 m, 9. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. SMNS. – Sabah, Mt. Kinabalu NP, Sayap, 1000 m, 26. XI. 1996 leg. GRIMM, 3 ex. SMNS. – Sabah, Mt. Kinabalu, Ma Mut, 12. VII. 1970 leg. ANDO, 2 ex. CAO. – Sabah, Crocker Range, km 63 on road between Kota Kinabalu and Tambunan, 1200 m, 19. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. MHNG. – Sabah, Crocker Range, Gunung Emas, 500–1900 m, 6.–21. V. 1995 leg. JENIŠ, 3 ex. CBH, 1 ex. SMNS.

Remarks: Parameres with 2 very small teeth each ventrolaterally near the tip (fig. 14), which are not mentioned in the original description and which occur also in investigated specimens from Sumatra (MHNG, SMNS). All other characters coincide with the description.

Distribution: Malayan Peninsula, Borneo, Sumatra.

2.17. *Derispia javana* Kaszab 1946 (figs 11–12)

Records: Borneo (KASZAB 1961a).

Material: Sabah, Crocker Range, Gunung Emas, 15.–27. IV. 1993 leg. JENIŠ & STRBA, 6 ex. CBH. – Sabah, Crocker Range NP, NW Keningau, 900–1200 m, 16.–20. XI. 1996 leg. SCHAWALLER, 8 ex. SMNS. – Sabah, Crocker Range NP, Rafflesia Centre, 1100–1400 m, 21. XI. 1996 leg. SCHAWALLER, 21 ex. SMNS. – Sabah, Crocker Range, km 60 on road between Kota Kinabalu and Tambunan, 1350 m, 17. V. 1987 leg. BURCKHARDT & LÖBL, 5 ex. MHNG, 2 ex. SMNS. – Sabah, Mt. Kinabalu NP, Headquarters, Liwagu river trail, 1655 m, 11. VIII. 1988 leg. SMETANA, 1 ex. MHNG. – Sabah, Mt. Kinabalu NP, Headquarters, 1500–1600 m, 11.–15. XI. 1996 leg. SCHAWALLER, 1 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, eastern ridge trail, 1060 m, 17. VIII. 1988 leg. SMETANA, 1 ex. SMNS. – Sabah, Mt. Kinabalu, Ma Mut, 12. VII. 1970 leg. ANDO, 1 ex. CAO.

Remarks: The aedeagus (figs 11–12) was unknown (female holotype), however the punctured elytra combined with the bordered clypeus and the dorsal colour pattern point to this species. Not coinciding with the description is the colour of the antennae, the distal part of the antenna is dark in all specimens and not fully light. Unfortunately I have no males from Java at hands to check the structure of the aedeagus, so conspecificity of the Java and Borneo populations remains somewhat insecure.

The firstly listed specimens from NW Keningau have the body unicoloured castaneous and the parameres somewhat different (fig. 11), all other characters are identical. These specimens are probably freshly moulted, still uncoloured specimens, collected together with larvae (see fig. 45) and pupae.

KASZAB (1961a) confused in the species key a main character to separate *javana* from *octomaculata*. In *javana* (with punctured elytra), the elytral lateral margin can be seen in dorsal view only in the basal part near the shoulders, in *octomaculata* (with unpunctured elytra), the elytral lateral margin can be seen on its total length (correctly described in KASZAB 1946).

Distribution: Java, Borneo.

2.18. *Derispia kuntzeni* Kaszab 1946

Records: Southeastern Borneo (KASZAB 1946).

Material: Not seen.

Distribution: Borneo.

2.19. *Derispia octomaculata* (Westwood 1883) (fig. 15)

Derispia xantusi Kaszab 1946 **n.syn.**

Records: Sarawak (KASZAB 1946, 1961a).

Material: Sarawak, Kuching, Santubong, 8.–9. III. 1990 leg. RIEDEL, 1 ex. SMNS. – Sabah, Kinabalu, Ma Mut, 12. VII. 1970 leg. ANDO, 1 ex. CAO. – Sabah, Bunsit, 28. VI. 1970 leg. ANDO, 4 ex. CAO, 1 ex. SMNS. – Sabah, near Ranau, 2. III. 1993 leg. UENO, 3 ex. CBH. – Sabah, Crocker Range 12 miles NW Keningau, 1200 m, 27.–28. III. 1991 leg. KATO, 2 ex. CAO. – Sabah, Bingkor N Keningau, 400–500 m, 19.–20. XI. 1996 leg. GRIMM & SCHAWALLER, 4 ex. SMNS.

Remarks: The single female from Santubong cannot be identified with certainty but has the same colour pattern on the elytra as the female holotype of *Derispia xantusi*. Later (KASZAB 1961a) assigned *xantusi* as one colour variation among others to *octomaculata*. Herein this taxon is formally synonymized, because the colour differences reflect no specific differences. Aedeagus see fig. 15.

Distribution: Borneo.

2.20. *Derispia parvula* Kaszab 1961

Records: Sarawak, Matang (KASZAB 1961a).

Material: Not seen.

Distribution: Borneo.

2.21. *Leiochrodinus tetraphyllus* Kaszab 1961

Records: Sarawak (KASZAB 1961c).

Material: Not seen.

Distribution: Borneo.

2.22. *Leiochrinus bifurcatus* Kaszab 1946

Records: Docsonlauden (KASZAB 1946), Sarawak (KASZAB 1961c).

Material: Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500–800 m, 15.–30. XII. 1995 leg. HÄUSER, 1 ex. SMNS.

Remarks: The above listed specimen is a female, with the pronotum deeply excavated at the anterior margin, and with the antenna black in the distal part and the antennomere 4 narrow.

Distribution: China, Assam, Burma, Borneo, Sumatra.

2.23. *Leiochrinus fulvicollis* Westwood 1883

Records: Sarawak (GEBIEN 1914), Borneo (KASZAB 1961c).

Material: Not seen.

Remarks: Probably, this species does not occur on Borneo. In the KASZAB collection in Budapest (HNHM) no specimen from Borneo could be found.

Distribution: New Guinea and adjacent small islands, ? Borneo.

2.24. *Leiochrinus lutescens* Westwood 1883

Records: Banguay (GEBIEN 1914), Kinabalu (KASZAB 1946), Sarawak (KASZAB 1961c).

Material: Sarawak, Kapit Distr., Sebang, Baleh river, 9.–21. III. 1994 leg. HORÁK, 1 ex. CBH. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500–800 m, 15.–30. XII. 1995 leg. HÄUSER, 1 ex. SMNS. – Sabah, Sepilok, IV.–V. 1982 leg. BURCKHARDT, 2 ex. MHNG. – Sabah, Sepilok, IV.–V. 1982 leg. HORÁK, 1 ex. SMNS. Sabah, Sepilok, 5.–11. VIII. 1983 leg. NOTSU, 1 ex. CAO.

Remarks: All listed specimens are females, with the pronotum feebly excavated at the anterior margin, and with the antenna yellow and the antennomere 4 wide.

Distribution: Borneo, Sumatra, Banguay, Sulawesi, Philippines, Korea.

2.25. *Leiochrinus rufofulvus* Westwood 1883

Records: Kinabalu, Imugin, Viscaya (KASZAB 1946).

Material: Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500–800 m, 15.–30. XII. 1995 leg. HÄUSER, 5 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500 m, 15.–16. XI. & 29. XI.–2. XII. 1996 leg. GRIMM & SCHAWALLER, 7 ex. SMNS. – Sabah, Mt. Kinabalu NP, Sayap, 1000 m, 25.–29. XI. 1996 leg. GRIMM & SCHAWALLER, 14 Expl. SMNS. – Sabah, Bunsit, 28. VI. 1970 leg. ANDO, 1 ex. CAO.

Remarks: Pronotum not excavated at the anterior margin, aedeagus as figured by KASZAB (1946).

Most of the specimens were collected at light. A female from Poring was infested by a nematod of 52 mm length.

Distribution: Borneo, Sumatra, Key.

2.26. *Leiochrodes affinis* Kaszab 1961

Records: Borneo (KASZAB 1961b).

Material: Not seen.

Distribution: Borneo.

2.27. *Leiochrodes bispilotus* Westwood 1883 (fig. 33)

Records: Sarawak (KASZAB 1946, 1961c).

Material: Western Sarawak, Quop, 3. III. 1914 leg. BRYANT, 1 ex. HNHM. – Sarawak, Sebadai Park, 9 km SW Kapit, 50 m, 20. V. 1994 leg. LÖBL & BURCKHARDT, 1 ex. MHNG. – Sabah, Crocker Range, Gunung Emas, 15.–27. IV. 1993 leg. JENIŠ & STRBA, 2 ex. CBH, 1 ex. SMNS. – Sabah, Crocker Range, Gunung Emas, 6.–21. V. 1995 leg. JENIŠ, 1 ex. SMNS.

Remarks: The aedeagus (fig. 33) was not figured up to now. The colour pattern of the dorsal side seems to be variable: 2 specimens from Gunung Emas have the elytra light brown with a humeral round and a distal sickle-shaped black spot, the other specimens, also from the same locality, are coloured as described by KASZAB (1949). Body length 3.0–3.9 mm.

Distribution: Borneo.

2.28. *Leiochrodes castaneus* Westwood 1883 (fig. 23)

Records: Sarawak (KASZAB 1946, 1961c).

Material: Western Sarawak, Mt. Matang, I. 1914 leg. BRYANT, 1 ex. HNHM. – Sarawak, Belaga, Long Linau, 17.–21. III. 1990 leg. RIEDEL, 3 ex. SMNS. – Sabah, Poring Hot Springs, 500 m, 8. V. 1987 leg. BURCKHARDT & LÖBL, 2 ex. MHNG, 1 ex. SMNS.

Remarks: The aedeagus (fig. 23) was not figured up to now but described when discussing the relations of *hayekae* (KASZAB 1961b).

Distribution: Borneo, Banguay, Sumatra.

2.29. *Leiochrodes christophi* n.sp. (figs 38–39, 44)

Holotype (♂): Sabah, Crocker Range, km 51 on road A 3 between Kota Kinabalu and Tambunan, 1600 m, leg. BURCKHARDT & LÖBL (MHNG).

Paratypes: Same data as holotype, 15 ex. MHNG, 5 ex. SMNS. – Sabah, Mt. Kinabalu, 1500 m, 21. V. 1987 leg. BURCKHARDT & LÖBL, 7 ex. MHNG. – Sabah, Mt. Kinabalu, road Ranau to Kota Kinabalu, 1150 m, 24. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. MHNG. – Sabah, Crocker Range NP, Rafflesia Centre, 13.–14. VI. 1996 leg. KODADA, 1 ex. SMNS.

Derivatio nominis: Named after Dr. CHRISTOPH HÄUSER (Stuttgart) for the organization of a joint travel to Sabah and his help during field work.

Diagnosis: To be recognized by the sexually dimorph metatibia which is in males abruptly broadened in the middle, by a distinct longitudinal furrow on the dorsal side of the metatibia in both sexes, by the structure of the aedeagus with deeply divided parameres, by unpunctured elytra and by small body size below 3 mm.

Description: Body length 2.5–2.8 mm. Dorsal and ventral side, antennae and legs unicoloured castaneous, elytra along basis and sutura somewhat lighter. Head without punctation and without carina on vertex; antenna with antennomere 3 relatively short and with antennomere 4 as narrow as antennomere 3 (fig. 39). Pronotum shiny and without punctation, basal margin unbordered, distal margin with fine bor-

der, lateral margin somewhat sinuate in the distal part. Elytra shiny and without punctuation, lateral margin to be seen in dorsal view in the anterior half. Metatibia in both sexes with a distinct longitudinal furrow on the dorsal side; metatibia of male on internal side abruptly broader in the distal half, external side uniform bent (fig. 44). Aedeagus (fig. 38) relatively small, distinctly bent in lateral view, basal piece about twice as long as parameres, parameres divided nearly up to the basis in 2 separate fingers, penis longer or as long as parameres depending from extension.

Discussion: The new species is quite similar in the outer appearance (body shape and size, shiny and unpunctured dorsal size) with the widespread *convexus* Lewis 1894, in particular both species possess the sexually dimorphic metatibia, which is quite unusual in the genus. However, it seems possible that this character was hitherto overlooked in some species, for example in *ruficornis* Kaszab 1946 from the Philippines ("Hinterschienen stark gekrümmt"). Quite unique in the genus is the distinct longitudinal furrow on the dorsal side of the metatibia in both sexes. Additionally, *christophi* n.sp. possesses a quite distinct structure of the aedeagus with separated parameres which is similar only in the Philippine species *glabriceps* Kaszab 1946, however with a distinctly shorter basal piece and with a shorter penis; furthermore *glabriceps* is significantly bigger (4.2 mm) and has no sexually dimorph metatibia.

2.30. *Leiochrodes circulus* Kaszab 1961

Records: Sarawak (KASZAB 1961b).

Material: Not seen.

Distribution: Borneo.

2.31. *Leiochrodes convexipennis* Pic 1918 (fig. 16)

Records: Brunei (KASZAB 1946).

Material: Sabah, Mt. Kinabalu NP, Headquarters, 1560–1660 m, 24. IV. 1987 leg. SMETANA, 1 ex. MHNG. – Sabah, Mt. Kinabalu, 1500–1650 m, 23. IV.–22. V. 1987 leg. BURCKHARDT & LÖBL, 9 ex. MHNG, 2 ex. SMNS. – Sabah, E Kinabalu, road between Ranau and Kota Kinabalu, 1150 m, 24. V. 1987 leg. BURCKHARDT & LÖBL, 3 ex. MHNG, 1 ex. SMNS.

Distribution: Borneo, Sumatra, Engano (type locality), Mentawai.

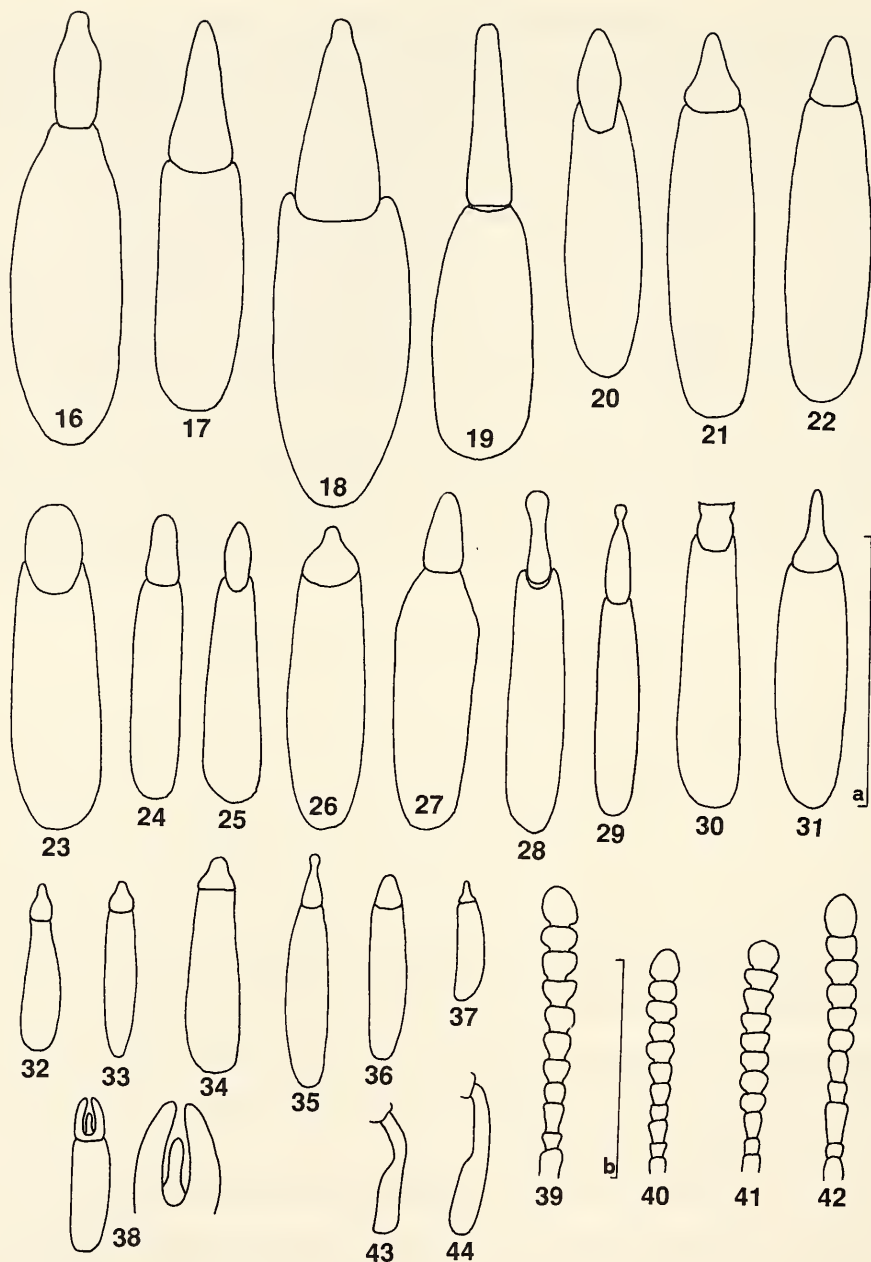
2.32. *Leiochrodes cyclops* Kaszab 1961

Records: Borneo (KASZAB 1961b).

Material: Northern Borneo, Sapulut, 9. IV. 1982 leg. YAMAMOTO, 1 ex. CSO.

Remarks: The description of this species was based on a single female without exact locality on Borneo. The above listed specimen possess the described flat body shape and colour pattern (pronotum red with longitudinal black spot, elytra black with a light yellow spot on the disc) but is a female too. Thus the status of this "species" without knowledge of the aedeagus remains somewhat doubtful.

Distribution: Borneo.



Figs 16–44. Aedeagus, antenna and male metatibia of *Leiochrodes* species. – 16. *convexipennis*; – 17. *rufofulvus* (Batu Punggul); – 18. *rufofulvus* (Keningau); – 19. *subaeneus*; – 20. sp. A (Poring); – 21. sp. B (Rafflesia Centre); – 22. sp. B (Sayap); – 23. *castaneus*; – 24. *ruficollis* (Gunung Emas); – 25. *ruficollis* (Liwagu river); – 26. sp. C (Matang); – 27. *semipunctatus*; – 28. *suturalis*; – 29. *glabratus*; – 30. *kinabaluensis* n.sp.; – 31. *smetanai* n.sp.; – 32. *limbatus*; – 33. *bispilotus*; – 34. *discoidalis*; – 35. *minutus*; – 36. *hayekae*; – 37. *merkli* n.sp.; – 38. *christophi* n.sp.; – 39. *christophi* n.sp.; – 40. *kinabaluensis* n.sp.; – 41. *merkli* n.sp.; – 42. *smetanai* n.sp.; – 43. *kinabaluensis* n.sp.; – 44. *christophi* n.sp. – Scales: 1.0 mm (a: aedeagus, b: antenna and male metatibia).

2.33. *Leiochrodes discoidalis* Westwood 1883 (fig. 34)

Records: Banguay (GEBIEN 1914); Brunei, Matang, Simujon river, Sadong river, Serawi, Putus Sibau (KASZAB 1946); Sarawak (KASZAB 1961c).

Material: Sabah, Sepilok, 13. V. 1981 leg. YAMAMOTO, 2 ex. CSO. – Sabah, Tambunan, 29.–30. III. 1984 leg. HANGAY, 24 ex. HNHM. – Sabah, Batu Punggul resort, 24. VI.–1. VII. 1996 leg. KODADA, 14 ex. SMNS.

Distribution: Malayan Peninsula, Borneo, Banguay, Sumatra, Java, Sumbawa, Nias, New Guinea.

2.34. *Leiochrodes glabratus* (Walker 1859) (fig. 29)

Records: Kinabalu, southeastern Borneo (KASZAB 1946); Sarawak (KASZAB 1961c).

Material: Sarawak, Kapit Distr., Sabong, Baleh river, 9.–21. III. 1994 leg. HORÁK, 5 ex. CBH, 1 ex. SMNS.

Distribution: Sikkim, Indochina, Sri Lanka, Borneo, Sumatra, Nias, Andamans, Java, Bali, Flores, Philippines, Taiwan.

2.35. *Leiochrodes harpagon* Kaszab 1961

Records: Borneo (KASZAB 1961b).

Material: Not seen.

Distribution: Borneo.

2.36. *Leiochrodes hayekae* Kaszab 1961 (fig. 36)

Records: Sarawak (KASZAB 1961b).

Material: Sarawak, Belaga Distr., Long Linau, 17.–21. III. 1990 leg. RIEDEL, 3 ex. SMNS. – Sabah, Crocker Range, km 48 on road A 3 between Kota Kinabalu and Tambunan, 1000 m, 5. IX. 1988 leg. SMETANA, 6 ex. MHNG, 2 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500 m, 7. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. MHNG. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 520 m, 13. V. 1987 leg. SMETANA, 1 ex. MHNG.

Remarks: The uppersides of the specimens from Sabah are nearly black and not castaneous as indicated in the description, all other characters, in particular the shape of the aedeagus, coincide with the description.

Distribution: Borneo.

2.37. *Leiochrodes kinabaluensis* n.sp. (figs 30, 40, 43)

Holotype (♂): Sabah, Mt. Kinabalu NP, above Poring Hot Springs, 520 m, 15. VIII. 1988 leg. SMETANA (MHNG).

Derivatio nominis: Named after Mount Kinabalu with the surrounding National Park, in which hopefully numerous endemic Coleoptera can survive.

Diagnosis: To be recognized by the sexually dimorph metatibia which is in males abruptly broadened in the middle, by the structure of the aedeagus with the short and blunt parameres, by unpunctured elytra and by small body size below 3 mm.

Description: Body length 2.2 mm. Dorsal and ventral side, antennae and legs unicoloured castaneous. Head without punctation and without carina on vertex; antenna with antennomere 3 relatively short and with antennomere 4 as narrow as an-

tennomere 3 (fig. 40). Pronotum shiny and without punctation, basal margin unbordered, distal margin with fine border, lateral margin somewhat sinuate in the distal part. Elytra shiny and without punctation, lateral margin to be seen in dorsal view in the anterior half. Metatibia without distinct longitudinal furrow on the dorsal side; metatibia of male on internal side abruptly broader in the distal half, external side bent before the middle and distal part straight (fig. 43). Aedeagus (fig. 30) distinctly bent in lateral view, basal piece nearly 6 times longer than parameres, parameres short with blunt tip.

Discussion: This species possesses a sexually dimorphic metatibia, which occurs only in very few congeners (see also *christophi* n.sp.). The shape of the aedeagus with the short and blunt parameres cannot be mixed up with those of other published species.

2.38. *Leiochrodes limbatus* Westwood 1883 (fig. 32)

Records: Sandakan (KASZAB 1946), Sarawak (KASZAB 1961c).

Material: Northern Borneo, Sapulut, 7. IV. 1982 leg. YAMAMOTO, 1 ex. CSO. – Sabah, Bajnaran Maitland, Batu Punggul, 25.–27. V. 1995 leg. JENIŠ, 1 ex. HNHN, 1 ex. CBH.

Remarks: The single specimen from Sapulut has the characteristically shaped and small aedeagus (fig. 32) but the elytra are more or less uniformly ferrugineous (and not ferrugineous with black margins). This difference is considered herein not as specific. Under this aspects it seems probably that *rufescens* Kaszab 1946 with quite similar shape of the aedeagus (described from the Philippines) might be a junior synonym of *limbatus* Westwood 1883, because both can be separated only by the colouration (KASZAB 1946). The shape and size of the aedeagus in *bispilotus* is similar (fig. 33), but the parameres are somewhat broader and shorter in *limbatus*. Unfortunately the material of both *bispilotus* and *limbatus* is too poor to recognize the variability of this character, this concerns also the colour pattern of the dorsal side.

Distribution: Malayan Peninsula, Borneo.

2.39. *Leiochrodes merkli* n.sp. (figs 37, 41)

Holotype (♂): Kalimantan, Gunung Palung NP, Cabang Panti research site, 1°13'S/110°7'E, 18.–26. VII. 1993 leg. MERKL (HNHN).

Paratype: Eastern Borneo, Batan Bessi, 1937 leg. WALSH, 1 ex. HNHN (n.sp. aff. *bispilotus* det. KASZAB).

Derivatio nominis: Named after Dr. OTTÓ MERKL (Budapest), who collected the holotype.

Diagnosis: To be recognized by the structure and little size of the aedeagus and the dorsal colour pattern.

Description: Body length 2.2–2.4 mm. Dorsal side with colour pattern, head and pronotum castaneous or pronotum castaneous with an indistinct dark patch, elytra dark brown with a light castaneous longitudinal band at the suture and light castaneous longitudinal lateral sides, antennae with the 3 basal segments somewhat lighter and legs unicoloured castaneous. Head without punctation and without carina on vertex but with a weak impression besides each insertion of the antennae; antenna with antennomere 3 twice as long as antennomere 2 and with antennomere 4 broader than antennomere 3 (fig. 41). Pronotum shiny and without punctation, ba-

sal margin unbordered, distal margin with fine border, lateral margin regularly rounded. Elytra shiny and without punctation, lateral margin to be seen in dorsal view nearly on its total length. Legs without peculiarities. Aedeagus (fig. 37) very small and feebly bent in lateral view, basal piece about 4 times long as parameres, parameres spatula-like.

Discussion: This species belongs to the group around *limbatus* and *bispilotus* with a relatively very small aedeagus, but the shape of the joint parameres is distinctly different (figs. 37), even considering a certain variability. Additionally, the colour of the dorsal side shows a specific pattern (by which already the late Dr. KASZAB recognized and labelled the specimen from Batan *bessi* as new).

2.40. *Leiochrodes minutus* Pic 1918 (fig. 35)

Records: Brunei, Kinabalu, southeastern Borneo (KASZAB 1946); Sarawak (KASZAB 1961c).

Material: Sarawak, Kapit Distr., Sebung, Baleh river, 9.–21. III. 1994 leg. HORÁK, 2 ex. CBH. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 485 m, 29. VIII. 1988 leg. SMETANA, 28 ex. MHNG, 6 ex. SMNS. – Sabah, Batu Punggul resort, 24. VI.–1. VII. 1996 leg. KODADA, 1 ex. SMNS.

Distribution: Sumatra, Borneo (type locality), Philippines.

2.41. *Leiochrodes penangensis* Kaszab 1961

Records: Penang (KASZAB 1961b).

Material: Sabah, Crocker Range, Gunung Emas, 500–1900 m, 6.–21. V. 1995 leg. JENIŠ, 1 ex. CBH, 1 ex. SMNS.

Remarks: The aedeagus is quite small (length about 0.6 mm) and of the shape as figured by KASZAB (1961b). Quite similar in shape is the aedeagus of *Leiochrodes* sp. C (see below 2.50.), but its size is with more than 1 mm distinctly larger (fig. 26).

Distribution: Borneo.

2.42. *Leiochrodes ruficollis* (Fairmaire 1893) (figs 24–25)

Records: Sarawak (KASZAB 1961c).

Material: Sabah, Mt. Kinabalu, 1750 m, 21. IV. 1987 leg. BURCKHARDT & LÖBL, 5 ex. MHNG, 3 ex. SMNS. – Sabah, Mt. Kinabalu, 1500–1550 m, 25.–30. IV. 1987 leg. BURCKHARDT & LÖBL, 3 ex. MHNG. – Sabah, Mt. Kinabalu NP, Headquarters at Liwagu river, 1500 m, 30. IV. & 16. V. 1987 leg. SMETANA, 2 ex. MHNG, 1 ex. SMNS. – Sabah, Mt. Kinabalu NP, Headquarters at Liwagu river, 1495 m, 12. VIII. 1988 leg. SMETANA, 1 ex. MHNG. – Sabah, Mt. Kinabalu NP, Headquarters at Silau-Silau trail, 1550 m, 14. VIII.–2. IX. 1988 leg. SMETANA, 2 ex. MHNG. – Sabah, Mt. Kinabalu NP, Headquarters, 1560 m, 3.–13. VIII. 1988 leg. SMETANA, 1 ex. MHNG. – Sabah, Headquarters, 24. V. 1981 leg. YAMAMOTO, 1 ex. CSO. – Sabah, Crocker Range NP, Gunung Emas, 1600 m, 6.–18. VI. 1996 leg. KODADA, 23 ex. SMNS, 2 ex. CBH.

Remarks: The species was described from Singapore, KASZAB (1946) assigned material from Sumatra and Java to this species and figured the aedeagus, although he could not check type material. The above listed specimens have the aedeagus quite similar to this figure, however the parameres are nearly parallel (fig. 24) or slightly narrowed (fig. 25). I could not find further differences, thus I consider the shape of the parameres somewhat variable.

Distribution: Malayan Peninsula, Sumatra, Borneo, Java.

2.43. *Leiochrodes rufofulvus* Westwood 1883 (figs 17–18)

Records: Matang, Sandakan, Pontianak (KASZAB 1946).

Material: Sarawak, Belaga, 14.–16. III. 1990 leg. RIEDEL, 1 ex. SMNS. – Sarawak, Belaga Distr., Long Linau, 17.–21. III. 1990 leg. RIEDEL, 2 ex. SMNS. – Sabah, Keningau, 13. III. 1989 leg. ITOH, 1 ex. CAO. – Sabah, Bajnaran Maitland, Batu Punggul, 25.–27. V. 1995 leg. JENIŠ, 1 ex. HNHM. – Sabah, Batu Punggul resort, 24. VI.–1. VII. 1996 leg. KODADA, 3 ex. SMNS.

Remarks: The shape of the aedeagus, in particular the shape of the basal piece, of this widespread species seems to be somewhat variable. In the specimen from Keningau (fig. 18) the basal piece is distinctly broader than the base of the parameres, in one specimen from Batu Punggul (fig. 17) the basal piece is narrower. These differences might be connected with the grade of sclerotization of that organ.

Distribution: Sikkim, Burma, Borneo, Banguay, Sumatra, Lombok, Sulawesi, Philippines.

2.44. *Leiochrodes semipunctatus* Kaszab 1946 (fig. 27)

Material: Sabah, Mt. Kinabalu NP, Summit trail Pondok Ubah, 2050 m, 26. IV. 1987 leg. SMETANA, 1 ex. MHNG.

Remarks: The species was described from Sumatra and the new record from Borneo is identical in the shape of the antenna, in the shape of the nearly conical pronotum with straight lateral margins and in the distinct punctuation of the elytra. The aedeagus (fig. 27) is somewhat different in the length relation parameres/basal piece and the tip of the parameres of the Bornean male is without any excavation (slightly excavated in the figure given by KASZAB 1946).

Distribution: Borneo (new record), Sumatra.

2.45. *Leiochrodes smetanai* n.sp. (figs 31, 42)

Holotype (♂): Sabah, Mt. Kinabalu NP, Poring Hot Springs, 480–500 m, 8.–10. V. 1987 leg. SMETANA (MHNG).

Paratypes: Same data as holotype, 8 ex. MHNG, 3 ex. SMNS. – Sabah, Mt. Kinabalu NP, Headquarters, Liwagu river, 1500 m, 16. V. 1987 leg. SMETANA, 1 ex. MHNG.

Derivatio nominis: Named after Dr. ALES SMETANA (Ottawa), who sifted not only this new species but numerous other Leiochrini in Sabah.

Diagnosis: To be recognized by the structure of the aedeagus with finger-like parameres.

Description: Body length 2.7–3.0 mm. Dorsal and ventral side, antennae and legs unicoloured castaneous. Head without punctuation and without carina on vertex; antenna with antennomere 3 nearly long as the antennomeres 4 and 5 together and with antennomere 4 narrow as antennomere 3 (fig. 42). Pronotum shiny and without punctuation, basal margin unbordered, distal margin with fine border, lateral margin regularly rounded. Elytra shiny and without punctuation, lateral margin to be seen in dorsal view in the anterior half. Legs without peculiarities. Aedeagus (fig. 31) feebly bent in lateral view, basal piece about 3 times as long as parameres, parameres finger-like.

Discussion: The shape of the aedeagus with the long and finger-like parameres is unique in the genus, at least I could not find any published species with such a

structure. Faintly similar is *lanceolatus* Kaszab 1961 (Yunnan, Nepal), but the parameres are shorter and the body is distinctly larger.

2.46. *Leiochrodes subaeneus* Pic 1918 (fig. 19)

Records: Banguey (KASZAB 1946), Sarawak (KASZAB 1961c).

Material: Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500 m, 11. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. MHNG. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 480–485 m, 24. VIII. 1988 leg. SMETANA, 1 ex. MHNG, 1 ex. SMNS.

Distribution: Sikkim, Banguey (type locality), Borneo, Java.

2.47. *Leiochrodes suturalis* Westwood 1883 (fig. 28)

Records: Banguey (GEBIEN 1914 sub *nigripennis*), Sarawak (KASZAB 1961c).

Material: Sarawak, Kapit Distr., Sebong, Baleh river, 6.–21. III. 1994 leg. BILY, 10 ex. CBB, 3 ex. SMNS. – Sabah, Tambunan, 30. III. 1984 leg. HANGAY, 1 ex. HNHM. – Sabah, Bajanaran Maitland, Batu Punggul, 25.–27. V. 1995 leg. JENIŠ, 1 ex. HNHM. – Sabah, Batu Punggul resort, 24. VI.–1. VII. 1996 leg. KODADA, 2 ex. SMNS. – Sabah, Sepilok, IV.–V. 1982 leg. HORÁK, 6 ex. MHNG. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 485 m, 14.–31. VIII. 1988 leg. SMETANA, 19 ex. MHNG. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500–800 m, 15.–30. XII. 1995 leg. HÄUSER, 25 ex. SMNS, 5 ex. MHNG. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500 m, 29. XI.–2. XII. 1996 leg. GRIMM & SCHAWALLER, 3 ex. SMNS. – Sabah, Mt. Kinabalu NP, Headquarters, 1500–1600 m, 11.–15. XI. 1996 leg. SCHAWALLER, 3 ex. SMNS. – Sabah, Crocker Range NP, NW Keningau, 900–1200 m, 16.–20. XI. 1996 leg. GRIMM & SCHAWALLER, 3 ex. SMNS. – Sabah, Crocker Range NP, Longkoganun, 750–850 m, 19.–21. VI. 1996 leg. KODADA, 11 ex. SMNS.

Distribution: Malayan Peninsula, Sumatra, Mentawai, Borneo, Java, Palawan, Philippines, New Guinea, Australia, Aru, Solomon, Hebrides.

2.48. *Leiochrodes* sp. A (fig. 20)

Material: Sabah, Mt. Kinabalu NP, Poring Hot Springs, Langanan falls, 900–950 m, 12. V. 1987 leg. BURCKHARDT & LÖBL, 2 ex. MHNG, 1 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, Langanan river, 850 m, 14. V. 1987 leg. BURCKHARDT & LÖBL, 2 ex. MHNG.

Remarks: This small series cannot be identified with certainty nor described as new. The shape of the parameres (fig. 20) is somewhat intermediate between *convexipennis* (fig. 16) and *ruficollis* (figs 24–25). As long as the infraspecific variability of the shape of the parameres in both widespread species is unknown I desist from describing these specimens as a new species.

2.49. *Leiochrodes* sp. B (figs 21–22)

Material: Sabah, Mt. Kinabalu NP, Sayap, 1000 m, 28. XI. 1996 leg. GRIMM, 1 ex. SMNS. – Sabah, Crocker Range NP, Rafflesia Centre, 13.–14. VI. 1996 leg. KODADA, 1 ex. SMNS.

Remarks: These both males can neither be identified because of the same reasons as the above treated *Leiochrodes* sp. A. The shape of the parameres (figs 21–22) points to the species-group around *ruficollis* (figs 24–25).

2.50. *Leiochrodes* sp. C (fig. 26)

Material: Sarawak, Gunung Matang, 20 km east of Kuching, 850 m, 25. V. 1994 leg. LÖBL & BURCKHARDT, 5 ex. MHNG, 1 ex. SMNS.

Remarks: This series could not be identified because of the same reasons as above, aedeagus see fig. 26. The shape of the parameres is quite similar to the parameres of *penangensis* (see above 2.41.), but its size is distinctly larger than in *penangensis*.

2.51. *Leiochrota marginellus* (Thomson 1878)

Material: Sabah, Mt. Kinabalu NP, Poring Hot Springs, 500 m, 29. XI.–2. XII. 1996 leg. SCHAWALLER, 1 ex. SMNS.

Remarks: The above listed specimen is a female and obviously not *varicolor* because of different body shape and size, different antenna and other characters, but its species identification remains insecure. The female is about 5.0 mm long, uniformly castaneous, has the pronotum and elytra without any punctuation and the last antennal segment fully light yellow. KASZAB (1946) did not study the type of *marginellus* (Thomson 1878) (Java) but of *uniformis* (Westwood 1883) (Sulawesi) and synonymized the latter. Later (KASZAB 1961c) he considered both as different species and separated them mainly by the colour of the last antennal segment (in *marginellus* last segment only partly yellow, in *uniformis* fully yellow). Additionally, KASZAB (1946) described *marginellus* with a dense punctuation on the elytra, later (1961c) he mentioned only a feeble punctuation for this species. I assign the single Bornean female to *marginellus* because this is the oldest valid name.

The status of the 2 Philippine species *philippinensis* (Gebien 1922) and *gracilicornis* (Kaszab 1946) is likewise unclear. I have material from Leyte, Luzon and Mindanao at hands (SMNS) which can neither be assigned with certainty to *philippinensis* nor to *gracilicornis* by the published characters.

Distribution: Java, Sulawesi, ? Borneo.

2.52. *Leiochrota varicolor* Westwood 1883

Records: Pontianak, Sandakan (KASZAB 1946); Sarawak (KASZAB 1961c).

Material: Sarawak, Belaga, Long Linau, 17.–21. III. 1990 leg. RIEDEL, 1 ex. SMNS. – Sabah, 16 miles from Keningau, 9. III. 1993 leg. UENO, 1 ex. CBH. – Sabah, Banjaran Maitland, Batu Punggul, 25.–27. V. 1995 leg. JENIŠ, 2 ex. CBH.

Distribution: Assam, Malayan Peninsula, Borneo, Java, Sumatra, Mentawai.

2.53. *Crypsis borneensis* Kaszab 1961

Records: Sarawak (KASZAB 1961c).

Material: Sarawak, Mt. Merinjak, 600 ft., 21. V. 1914 leg. BRYANT, 1 paratype HNHM.

Distribution: Borneo.

2.54. *Pimpla hemisphaericum* (Laporte 1831)

Records: Borneo (GEBIEN 1914 sub *Leiochrodes tenebrosus*); Brunei, Sarawak, Kinabalu, Tandjong (KASZAB 1946).

Material: Sarawak, Belaga, Long Linau, 17.–21. III. 1990 leg. RIEDEL, 1 ex. SMNS. – Sabah, Mt. Kinabalu NP, Poring Hot Springs, 485 m, 29. VIII. 1988 leg. SMETANA, 7 ex. MHNG. – Sabah, Mt. Kinabalu NP, Mt. Kinabalu, 1500 m, 21. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. MHNG. – Sabah, Mt. Kinabalu NP, Mt. Kinabalu, 1900 m, 26. IV. 1987 leg. BURCKHARDT &

LÖBL, 1 ex. MHNG. – Sabah, Mt. Kinabalu, road Ranau to Kota Kinabalu, 1150 m, 24. V. 1987 leg. BURCKHARDT & LÖBL, 1 ex. MHNG, 1 ex. SMNS. – Sabah, Mt. Kinabalu NP, Headquarters, Bukit Ular trail, 1750 m, 29. IV. 1987 leg. SMETANA, 1 ex. MHNG, 1 ex. SMNS. – Sabah, Banjaran Maitland, Batu Punggul, 25.–27. V. 1995 leg. JENIŠ 13 ex. CBH. – Sabah, Batu Punggul resort, 24. VI.–1. VII. 1996 leg. JENIŠ, 1 ex. MHNG. – Sabah, Batu Punggul resort, 24. VI.–1. VII. 1996 leg. KODADA, 7 ex. SMNS. – Sabah, Crocker Range NP, Mawar waterfall, 17. VI. 1996 leg. KODADA, 1 ex. SMNS.

Remarks: The “species” is quite variable in external characters (punctuation on head and pronotum, shape of pronotum and elytra, structure of elytral intervals and others) and also the aedeagus shows a somewhat different shape in some checked populations from the wide distribution area. Thus it might be possible that we face not only a single but several different species. Unfortunately the material at hands is too poor for solving this problem; additionally all type series of the different “synonyms” (see KASZAB 1946) should be checked.

Distribution: India, Nepal, Borneo, Sumatra, Java, Philippines, New Guinea.

3. Phylogeny

The status of the Leiochrini as a monophyletic group is accepted and based on several characters both of adults and larvae (WATT 1974), the same author placed the Leiochrini together with the American Nilionini in the tenebrionid subfamily Niliioninae. After WATT (1974), the sister-group of Nilioninae is the group containing the Toxicinae, Phrenapatinae, Diaperinae, Gnathidiinae, Tenebrioninae and Alleculinae. KASZAB (1946) considered the Diaperini as the closest relatives of the Leiochrini, however presenting only characters for similarities, not for relationship.

In contrast to the monophyly of the tribe, not a single of all 11 Leiochrini genera is characterized as a monophyletic unit by a synapomorphic character. For example, the tarsal morphology is considered as an important character for separating the genera (tarsal joints simple in *Derispia* and *Stethotrypes*, prolonged differently in *Leiochrodes*, *Crypsis* and others). It cannot be excluded, that tarsal morphology is only an adaptation to a special habitat, having evolved convergently in different genera, thus tarsal morphology cannot be used as apomorphic character. Additionally, *Derispia* and *Stethotrypes* are mainly separated traditionally by the head morphology (male head with horns in *Stethotrypes*, without horns in *Derispia*). In the meantime, some *Stethotrypes* are described (also in this paper) with males without distinct horns but with only elevated cheeks. On the other hand, at least one *Derispia* species (*rufescens* Pic 1921) is said to have the cheeks elevated. Further studies are necessary to prove the monophyly of the Leiochrini genera, considering also outgroups.

It is striking, that in all species-rich genera of the Leiochrini species groups exist with completely different shape of the aedeagus. In *Stethotrypes*, *Derispia* and *Leiochrodes*, the species can be arranged to groups with a simple symmetrical aedeagus with quite uniform parameres and penis up to groups with quite complicated, asymmetrical structures, which can be surely considered as apomorphic. However, it is not known, whether these species groups based on aedeagal morphology represent natural groups.

4. Distribution

From the 51 Bornean Leiochrini species, 29 species (57%) have been found only on Borneo and Banguay combined, or even only on Banguay. 8 species (16%) occur not only on Borneo but also on other Sunda islands like Sumatra, Mentawai, Java or Sulawesi. The rest of the species (about 30%) are known also from the Asian continent on the Malayan Peninsula up to Burma and China, from the Philippines and from New Guinea. Although all members of Leiochrini have fully developed wings, the range of distribution seems different in the different genera. The genera *Stethotrypes* and *Derispia* contain the most species with smaller areas, whereas the members of *Leiochrinus* and *Pimplena hemisphaericum* possess quite wide distributions.

The data base is too small to give detailed informations about the horizontal and/or vertical distribution of the Leiochrini species in Borneo proper. Although some species are known only from Sarawak or only from Sabah, or in Sabah even only in the Kinabalu NP or in the Crocker Range NP, this surely reflects only deficiencies of our knowledge and not the real distributional patterns. There might be some tendencies in a vertical horization of the species but further collections will distinctly disarrange the present picture. For example, *Leiochrodes semipunctatus* is known from Borneo by a single record at Mount Kinabalu in an altitude of 2050 m being the highest record of all Leiochrini on Borneo – but this species was described from Sumatra from distinctly lower altitudes.

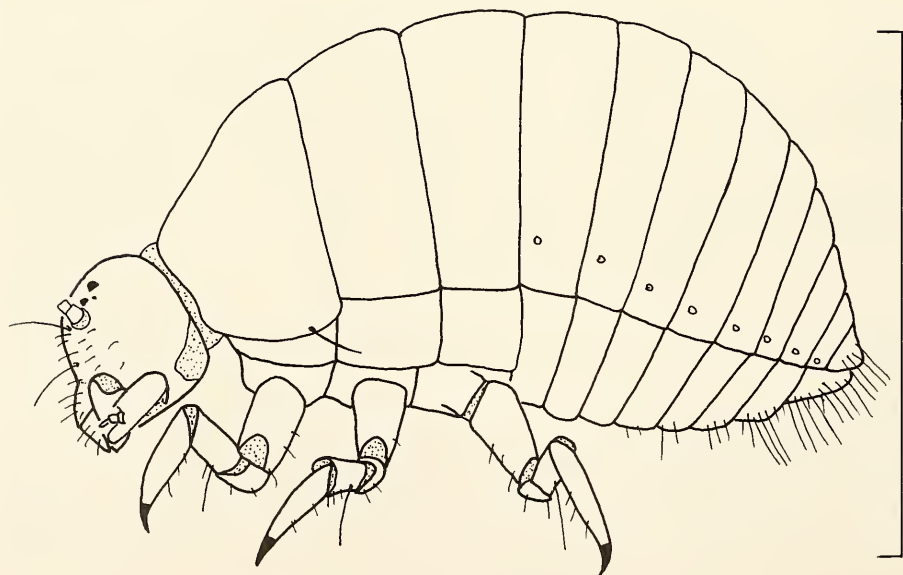


Fig. 45. Larva of *Derispia javana* (Crocker Range NW Keningau, 900–1200 m, 16.–20. XI. 1996 leg. SCHAWALLER) in lateral view. – Scale: 2.0 mm.

5. Biology

According to my own observations in the Himalayas, the Philippines and in Borneo, the species of the Leiochrini feed on mosses and algae covering rocks, tree barks, rotten wood and in the forest litter. Never I found them feeding on fungi like members of the Diaperini and many other tenebrionids. Leiochrini mainly prefer humid habitats, but I could find them active in a few cases also in dry conditions. In Borneo I found adults of *Stethotrypes poringicus* n.sp. and of *Derispia javana*, feeding together with their larvae on wet tree barks. A larva of Leiochrini was firstly figured by BÖVING & CRAIGHEAD (1931: plate 59), their general shape is oniscoid (fig. 45) and quite different from other tenebrionid larvae.

The prolonged tarsal joints occurring in some genera of the Leiochrini may be interpreted as an adaptation to smooth and wet habitats on rocks and barks. Similar tarsal structures exist convergently in some groups of Byrrhidae living in comparable habitats.

At least some of the Leiochrini species are active during day. This holds true in particular for the species with a striking colour pattern. It seems probable that mimicry relations have coevolved with the quite similar shaped and figured Coccinellidae, as a defence for those species of the Leiochrini feeding on open rocks and barks not covered by vegetation. But Leiochrini might be active during night too. The unicoloured *Leiochrinus rufofulvus* is attracted regularly by light traps, as well as the fully winged species of *Stethotrypes* and *Leiochrodes*.

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